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A Seventeenth Century Garden.

EARLY in the seventeenth century, and not long after Ieyasu by the selection of Yedo for the Shoguns' capital made it the most important city in Japan, the Prince Mitsukuni laid out within the borders of the city a garden in which to find, after a life of labor, a peaceful old age. This garden, which has been maintained in an excellent state of preservation, is one of the most interesting sights of Tokyo; and, in view of its age and the purity of its style, is certainly one of the most remarkable and instructive pieces of landscape-gardening in existence. Korakuen, as it is called, forms a part of the grounds connected with the Koishikawa Arsenal, and English-speaking travelers in Japan know it as the Arsenal Garden.

In conception and design this garden is Chinese, for the Japanese, with their other arts, brought many centuries ago the art of landscape-gardening from China where what we call the natural style was conceived and brought to a high state of perfection long before it was thought of in Europe. In Japan several examples of good Chinese gardening art exist, all dating from the early years of the seventeenth century, notably the Garden of the Golden Pavilion connected with the Rokunji Monastery at Kyoto and that of Ginkakuji in the suburbs of that city, although none of them compare in simplicity of design and preservation with the Arsenal Garden at Tokyo, in which, probably, the gardening art of China can now be studied better than in China itself, where many of its best examples have been destroyed during the last fifty years or have been allowed to fall into ruin.

The Arsenal Garden occupies, perhaps, twenty acres of ground, although it is so skillfully planted that its area may not be ten acres or it may be fifty; of the shape of the piece of ground it covers the visitor can form no idea whatever. In reality it is a parallelogram, rather longer than broad. The garden is entered through a small and rather shabby outer garden of the prevailing Japanese fashion, with the pond of dirty water surrounded with its irregular semi-rustic stone coping and filled with plethoric part-colored gold-fish, with the Box and Holly plants cut into fantastic shapes, the masses of closely clipped Azaleas and Enkianthus, the piles of moss-covered rocks as full of associations to the Japanese mind as they are meaningless to ours, with the artificially moulded surface of the ground, the contorted Pine-tree, the unhappy-looking Apricots, and the leafless Cherry-trees. This dreariness and unnatural monotony serve, however, to intensify the pleasure which the visitor feels as soon as he passes the simple gateway in the high masonry wall which surrounds the inner enclosure; then he finds himself in a broad walk paved in the middle for a width of five or six feet, with flat, irregularly shaped stones raised a few inches above the surface, the whole being constructed in imitation of that portion of the Tokaido, the great sea-coast highway of Japan, which crosses the pass in the Hakone Mountains. This path winds gracefully through a grove of Live Oaks, Camphor-trees, Camellias and Hollies, and in the hottest day of summer affords a retreat as cool as a grotto. On either side the ground rises and falls in natural undulations and is covered under the trees with a thick carpet of evergreen plants, Aucubas, Aralias, and many Ferns; ascending and descending as it crosses the undulations of the surface it reaches the shores of a lake at a point where the broadest and most perfect view of the garden is obtained. Here the lake, made in imitation of a famous sheet of water in China which occupies perhaps half the area of the garden, can be seen in all the simplicity of its design surrounded by what appear to be high hills clothed to their summit with an unbroken mass of evergreen foliage through which here and there the tall spire of a great Fir-tree stands out boldly against the sky. The walk now leaves the border of the lake, and, crossing a small lawn, passes by a tea-house, and, plunging into the woods, rises and falls sometimes steeply, at others gradually, as it leads the visitor around the borders of the garden; now it comes to a point from which a vista has been cut through the trees for a view across the lake; now it passes a miniature reproduction of the temple of Kiyomizu at Kyoto, and then by a shrine which commemorates the glory of two Chinese brothers famous because they preferred death to disloyalty; then across an arching stone bridge to an octagonal shrine, so formed in allusion to the eight diagrams of the Chinese system of divination; and then over a rushing torrent which falls with a high cataract into the lake, and by other lawns finally reaches the point where the shore of the lake was first approached. The wonders of this walk are its mystery and quiet, for while it is perhaps not more than half a mile long, it appears, so varied is it in interest, to extend for miles, and, in the midst of a great city, it seems to climb the hills and to cross the ravines and streams of a primeval forest.

The Arsenal Garden occupies what was once probably a perfectly level piece of ground. The soil, taken from the site of the lake, was heaped up around the borders to protect them and to diversify the surface, and then the water which fills the lake was introduced at the highest point of the artificial hills and allowed to fall naturally in a series of cascades; the natural grouping of a few varieties of harmonious trees did the rest, the whole producing a result so quiet and perfect that a visitor standing on the shore of the lake might well imagine himself a thousand miles from any human habitation. The little tea-house where guests are refreshed, the shrines and temples, the bridges and the other structures which make the walk through the garden interesting, are all hidden and do not intrude upon the harmony of the scene. And hidden, too, are the special collections of plants which add to the attractions of the garden without disfiguring it as a work of art. At one point the principal walk passes through a little grove of Apricot-trees dear to the hearts of all Japanese, for the flowers

which cover the naked branches in February tell them of the coming of spring; in another part of the garden there is a collection of Cherry-trees which produce their pink and white flowers after those of the Apricots have fallen; at one point where the trees recede from the shores of the lake, leaving a grass-covered recess, are a number of Wistaria-vines trained over low frames in the Japanese fashion; and in the middle of another little lawn is an Iris-garden, with irregularly shaped sunken beds separated, like those of a Rice-field, by narrow walks. Each of these special features makes the garden interesting at a particular time of the year, while they are so carefully placed that they do not interfere with the artistic feeling which controls it and has made it what it is; and it is this grouping of inharmonious units, buildings, and collections of plants in such a way that they do not intrude themselves in the landscape, which is the chief merit of this garden and which makes it so worthy of study.

The mere lover of plants, as well as the student of the art of gardening, will find much to interest him in Mitsukuni's creation, for in this garden he will find some of the finest trees that can be seen in Japan, and among them several which are probably as old as the garden itself; and it is interesting to note that, although as a general rule the Japanese cultivate Chinese rather than Japanese plants in their gardens, here the plantations are composed almost entirely of Japanese trees; and that none of the clipped, dwarfed and distorted plants, which are always a feature in the gardens of the Japanese school, appear here. On the hills above the lake are splendid specimens of the Camphor-tree, and of the two familiar Live Oaks of central Japan (Quercus cuspidata and Quercus glauca); nowhere can be seen nobler plants of the two broad-leaved Hollies of Japan, Ilex latifolia and Ilex integra; the common Japanese Maple, growing here to its largest size, dips its delicate branchlets into the waters of the placid lake, while above it the Momi (Abies firma), the handsomest of all the Japanese Firs, sends up its straight, massive stems to the height of at least a hundred and fifty feet. Here are thickets of the great arborescent Bamboos, which are still largely planted in all the temperate parts of the empire; and in this garden is to be seen what experts declare is the finest plant of the so-called square-stemmed Bamboo known.

The garden is admirably kept, indeed, so well kept, that the keeping seems to be the work of nature, and the interference of man's hand is barely noticeable, except, perhaps, in the too formal trimming of the margin of the lake at those points where the trees do not grow close down to the water. But, except for this single fault, it is not easy to see how this garden, created before Le Nôtre was born, and when the art of landscape-gardening was unknown in Europe, could be improved, or how a more natural, restful or delightful spot for all seasons of the year could be made in the midst of a great city.

In the arrangement in this garden of special collections of plants selected for the purpose of producing a display of flowers at different seasons of the year, and so placed that the general landscape-effect of the whole is not interfered with, there is perhaps an idea which can be adopted advantageously in other parts of the world. It is the expression of the love of the Japanese for particular flowers and of the popularity of the flower-festivals held in spring, when the Apricot-trees and the Cherry-trees bloom; in summer, when the Wistaria, the Irises and the Morning-glories are in flower, and in the autumn, at the season of the Chrysanthemum and when the leaves of the Maple-trees assume their brilliant coloring. Every public garden in Japan contains collections of these plants, at least of the Apricots, the Cherries and the Maples, and they are visited by the greatest number of people when these plants are in flower. Their flowering is the excuse for parties of pleasure, and the intelligence of millions of people has in this way been quickened by their interest in the unfolding of the petals of Cherry-trees or Wistarias.

It is certainly possible to arrange in the parks of any great city special collections of hardy flowering plants in sufficient numbers to make their flowering an object of enough public interest to draw into the parks at these particular times many people who, without some special object, would never go into them at all. As our cities grow large and absorb the surrounding country, many of their inhabitants must pass their lives in ignorance of some of the most beautiful things in nature, without beholding, for example, the glory of an Apple-tree in flower. In some corner of any one of our large parks, or, better, in different parks in a series or system, a number of permanent outdoor flower-shows might be arranged which would add immensely to their value as places of resort, and would have a powerful influence in directing and educating the public taste. There are many trees, for example, with showy and beautiful flowers, which only display their greatest beauty when massed together in considerable numbers, and if the people of our cities had the opportunity to see such collections they would very soon make holidays for the purpose, and flower-festivals before many years would become as much a part of the life of our cities as they have become in Japan.

The Ginger-beer Plant.

A VERY thorough and interesting study of what is called in England, and in some parts of this country, the Ginger-beer plant, has recently been published by Professor H. Marshall Ward, whose investigations have been prosecuted for several years. The plant is usually found in small lumpy masses, which look like sago or tapioca, and vary in size from as small as a pin-head to as large as a plum. It is these lumps which have been used from an unknown date for producing the fermentation in the making of ginger-beer, but the exact nature of the lumps and the way in which they produce the fermentation was unknown, although it had been supposed that they resembled the Kephir-grains, which have been studied by several botanists.

Professor Ward finds that the masses of the Ginger-beer plant are composed of a mixture of several forms of yeast plants and bacteria, not to mention other fungi which we may call molds. It was his object to discover exactly which of the forms were the active agents in producing the fermentation, and which were unessential, or more properly accidental, constituents of the masses. With this object he isolated the different forms by means of cultures, and, after obtaining pure cultures of the different forms, studied their chemical and physiological action individually, and afterward in combination with one another. The subject is a difficult one, and Professor Ward was forced to contrive a number of rather complicated systems of apparatus in his very careful investigation, of which we can only state briefly the result.

The three principal yeast fungi found in the masses were Mycoderma cerevisiæ, a common form found especially on the surface of stale beer, Cryptococcus glutinis, a pink form, and a new species to which he gave the name of Saccharomyces pyriformis. Of these three forms, the two first named were proved not to be essential to the fermentation. S. pyriformis, however, must be regarded as the really active yeast of the Ginger-beer plant. It resembles in its ordinary condition the Saccharomyces ellipsoideus of some wine fermentations, but is distinguished by the following characters: It is a bottom yeast which ferments cane sugar; it produces spores in from two to four days at 25 degrees C., and in beer-wort forms at length a film over the surface composed of pear-shaped cells from which the species derives its name.

A number of forms of bacteria were found in the masses mixed with the yeasts, among them the Bacterium aceti of acetic acid fermentation, but the only specially active bacterium was a new species named Bacterium vermiforme from the gelatinous, worm-like coils which it forms under favorable conditions. The habits and action of this bacterium are very complicated. It is sometimes in the condition of free filaments, or short rods and motile, and sometimes the filaments are fixed in gelatinous sheaths. After a long series of experiments it was found that the sheath form was only found when the bacterium was growing in media, in which there was no oxygen, and that when it was removed to cultures in which oxygen was present, the filaments escaped from the sheaths

and remained free as long as the supply of oxygen was kept up.

Perhaps the most interesting part of Professor Ward's investigation is the account of his attempt to reconstruct the Ginger-beer plant after having separated the constituent yeasts and bacteria by means of pure cultures. He combined the different forms one with another, and found that in order to reconstruct the Ginger-beer plant it was only necessary to combine Saccharomyces pyriformis and Bacterium vermiforme, the other forms having no special significance in this case. When growing in a saccharine fluid the Saccharomyces was proved, either by its direct chemical action on the fluid itself or by excreting some substance during its growth, to render the fluid especially well-fitted for the growth of the bacterium in its sheath form. The better one grew the better the other grew, and Professor Ward considers this a clear case of symbiosis. Where the ginger-beer plant first came from is unknown, but by placing lumps of unsterilized sugar and pieces of unsterilized ginger in water, Professor Ward was able to produce a Ginger-beer plant like that in common use. But the studies in this direction are to be carried out more fully hereafter, and it is not yet certain whether the Ginger-beer plant in the experiment last mentioned came from the sugar or the ginger.

The Coast Dune Flora of Lake Michigan.—II.

OTHER evidences of the mingling of species on the coast dune are the appearance there of trees of different habits, presenting novel and, at times, delightful conformations of form and color. Within a small area I have seen the Black Oak—the most common Oak of the sand region—and the Bur Oak, the Black Willow (Salix nigra) and the Cottonwood. Some of the trees supported a heavy growth of Frost Grapes, which had climbed up their trunks and were bending down their limbs. The ground at the root of the trees was covered with dense undergrowth of Willows, Osiers and Hazel-bushes. Celastrus scandens is another vine which twines among the branches of the trees. The Poison Ivy (Rhus Toxicodendron) is a common occupant of the ground; it is always the low, trailing form, sending up branches a foot or two high, not unattractive in foliage and pale fruit. Other trees often seen on the shore are the Red Cedar, the Jack Pine and the White Pine. One of the first trees to gain a foothold is the Cottonwood, seedlings of which are seen springing up in the damp sand as low down on the beach as the waves permit, to be washed out or buried, perhaps, by some heavy storm. On the coast dune, which it may fringe for several miles in succession, this tree takes a low, spreading, and often, somewhat bushy form, sometimes about as broad as it is high, the limbs so low that the pendent racemes of fruit trace furrows in the sand as they are moved to and fro by the wind.

Rosa blanda is the most common Rose by the lake-shore. R. Engelmanni and R. humilis also occur. A form with very prickly stems, blossoming throughout the summer, and resembling R. Arkansana, if not identical with it, is frequent. Hudsonia tomentosa is another little shrub, with prostrate stems and numerous branches, very pretty when covered with hoary leaves and a profusion of yellow flowers.

The play of sunlight on the masses of foliage formed by the various bushes, with their differing shades of green, is very beautiful. There is a charming variety of color, subdued and restful to the eye, which is dazzled by the glitter from the white sand or the reflection from the water. The groups also have a wavy outline, due to the little mounds of sand heaped about them along the common dune. One or two kinds may occupy the top of a hillock and others clothe its sides or skirt its base, the colors blending or contrasting.

There are other herbaceous plants besides those already mentioned, which give variety to the coast dune and the bordering beach. The most common Golden-rod is Solidago humilis and its variety Gilmani. They bear rather large heads of flowers. S. nemoralis is frequent, and S. speciosa and its variety angustata are sometimes seen, making handsome reaches of showy flowers. Asters are not so common as Solidagos in the coast sands, but Aster multiflorus, A. ptarmicoides, A. sagittifolius and A. azureus are often found, the last two in more sheltered situations among or near the shrubbery. Cnicus Pitcheri is a Thistle almost confined to the shore. It is a low-branching plant, conspicuous by its hoary stem and leaves, usually standing apart from other plants in the bare sand. Zygadenus elegans, a liliaceous plant, may be found growing in company with this Thistle farther down the lake. It is a singular companionship for a plant one may find in a Cedar-swamp or by the mossy brook-side amid the stones. Anemone multifida is found in similar situations, and Campanula rotundifolia, var. arctica, is more widely spread. This is usually a taller plant than the type, and has narrower leaves and larger flowers. The Bug-seed (Corispermum hyssopifolium) and the Winged Pigweed (Cycloloma platyphyllum) are also met with, the latter an introduction from the west. Both have spreading bushy tops when not growing too thickly, branching close to the ground like the Tumble-weed. More humble plants are Euphorbia polygonifolia, which spreads flat on the ground, and Cakile Americana, the American Sea-rocket, a fleshy plant, with small, but numerous, pink or purple flowers. Both these annuals grow in the damper sands, and are strictly plants of the beach, the Cakile establishing itself nearer the water than any other.

A Wild Bean (Strophostyles angulosa) is frequent near the shore. It is variable in habit, being sometimes nearly erect and from six to twelve inches high, or with a procumbent stem that may be six or eight feet long. It often climbs over bushes and bunches of grass, if near at hand. The stems and terete pods, and sometimes the whole plant, are tinged with purple. The Beach Pea (Lathyrus maritimus) grows along the base of the coast dune, and forms patches of considerable extent. The stems are from one to two feet long. The leaflets are large, and the handsome racemose flowers are purple, changing to blue with age. It is one of the most attractive plants of the lake-shore. It is easily propagated, the perennial root being tenacious of life, and spreads readily along the railway embankments which approach the shore. Petalostemon violaceus is another showy plant of the same family which comes down to the beach, making a large bunch of stems which rise from a strong, deeply growing root.

Among the Sedges the most characteristic Cyperus is C. Schweinitzii. It has a stiff and wiry culm, one to two and a half feet high. Cyperus filiculmis is a prettier and more ornamental plant, with a shorter and more slender culm, terminated by a dense, roundish head, or by several on spreading rays of unequal length. Of Carex the more usual kinds are such dry-ground species as C. cephalophora, C. Muehlenbergii and C. Pennsylvanica, the latter near the base of trees. Equisetum hyemale, the Scouring Rush, is seen in the lower and damper parts of the dune, with coarse stems sometimes three or more feet high.

The plants mentioned have all been seen along the beach or on the first ridge of sand which borders it, and form the mass of the coast flora. Other less noticeable ones might be added, with estrays coming in occasionally, especially upon the more sheltered slope facing away from the lake. Of these the handsome Hypericum Kalmianum, Potentilla fruticosa, P. anserina, and farther north P. tridentata and Rosa Sayi are most worthy of notice. The plants named are oftenest seen, and seem best fitted to endure the rough treatment to which they are exposed from the fierce winds of the lake. They vary a good deal in the effectiveness with which they bind the loose sands, but the humblest shares in the work by offering points of resistance. The roots usually run deep and are considerably branched, some of the most abundant grasses and shrubs dividing extensively and forming a network of roots and fibres in the loose soil.

Englewood, Chicago, Ill. *E. J. Hill.*

Notes on the Forest Flora of Japan.—III.

THE general character of the composition of the Japanese forests having been briefly traced in the first chapters of these notes, I shall now say something of the most important Japanese trees; and as their botanical characters are already pretty well understood and their economic properties are only of secondary interest to the general reader, these remarks will relate principally to their quality from a horticultural point of view. A comparison with allied eastern American species will perhaps be useful; it will, at any rate, show that, while Japan is extremely rich in the number of its tree species, the claim that has been made, that the forests of eastern America contain the noblest deciduous trees of all temperate regions, can, so far as Japan is concerned, be substantiated, for, with few exceptions, the deciduous trees of eastern America surpass their Asiatic congeners in size and beauty.

To begin with the Magnoliaceæ. In the number of genera of the Magnolia family Japan is not surpassed by any other botanical region, eight of the twelve genera being represented in the empire, while in the United States there are only four. In Japan arborescent Magnoliaceæ

reach the most northern limit reached in any country by these plants, and one of the most interesting features of the Japanese flora is the presence in Yezo of three large trees in two genera of this tropical and semi-tropical family as far north, at least, as forty-four degrees, while the representative of a third genus, Schizandra, is found still further north on the Manchurian mainland. In eastern America two species of Magnolia reach nearly as high latitudes as this genus does in Japan, but in the United States Magnolia is really southern, and has only succeeded in maintaining a precarious foothold at the north, while in Yezo it is a most important element and a conspicuous feature of the forest-vegetation. Of the eight genera of Magnoliaceæ represented in Japan, all but two, Schizandra and Kadsura, which are woody climbers, are trees, while in America Magnolia and Liriodendron are the only arborescent genera in the family.

Of the Japanese trees of the family, Euptelæa polyandra is the least desirable as an ornamental plant, and will probably never be very much cultivated except as a botanical curiosity. It is a small tree twenty to thirty feet in height, with a slender straight trunk covered with smooth pale bark, stout, rigid, chestnut-brown branchlets marked with white spots, and wide-spreading branches, which form an open, rather unsightly, head. The leaves are ample and bright green; they are thin, prominently veined, sometimes five or six inches long and broad, nearly circular in outline, deeply and very irregularly cut on the margins, with a long, broad, apical point, and are borne on long slender petioles. In November they turn a dull yellow-brown color before falling. The minute flowers appear in early spring before the leaves, and are produced in three or four-flowered clusters from buds formed early in the previous autumn. They have neither sepals nor petals, and consist of a number of slender stamens surrounding the free, clustered carpels. The fruit, which ripens in November, is not more showy than the flowers; it is a small, stalked samara half an inch long and furnished with an oblique marginal membranaceous wing. The handsomest thing about this tree is the winter-bud, which is obtuse, half an inch long, and covered with imbricated scales, which are bright chestnut-brown and as lustrous as if they had been covered with a coat of varnish. Euptelia polyandra is found in the mountainous forests of central Japan usually on the banks, or in the neighborhood, of streams between 2,000 and 3,000 feet above the sea-level, but it does not appear to be anywhere very common. It is the type of a small genus represented in the flora of Bombay by a second species.*

Cercidiphyllum Japonicum, the second of the Japanese trees of the Magnolia family, is the representative of a monotypic endemic genus. It is the most interesting, as it is the largest deciduous tree of the empire, and, more than any other of its inhabitants, gives their peculiar appearance and character to the forests of Yezo. Of the botanical characters and relationship of this tree we shall have something to say in a later issue, in connection with a figure of the male and female flowers, for Cercidiphyllum is dicœcious and produces its minute apetalous precocious staminate and pistillate flowers on different individuals. In Yezo, Cercidiphyllum inhabits the slopes of low hills and selects a moist situation and rich deep soil, from which the denseness of the forest and the impenetrable growth of dwarf Bamboo, which covers the forest-floor, effectually check evaporation. In such situations it attains its greatest size, often rising to the height of a hundred feet, and developing a cluster of stems eight or ten feet through. Sometimes Cercidiphyllum forms a single trunk three or four feet in diameter and free of branches for fifty feet above the ground; but more commonly it sends up a number of stems, which are united together for several feet into a stout trunk and then gradually diverge. The trunk of a typical Cercidiphyllum of this form appears in the illustration on page 53, of this issue. It is the reproduction of a photograph made last summer on the hill near Sapporo alluded to in the first number of these notes, and represents a large, but by no means an exceptionally large, trunk, which, at three feet above the ground, girted twenty-one feet six inches.

The trunk of Cercidiphyllum is covered with thick pale bark, deeply furrowed and broken into narrow ridges. Similar bark covers the principal branches; these are very stout and issue from the stem nearly at right angles; gradually drooping, the slender reddish branchlets in which they end are often decidedly pendulous. The upper branches and branchlets are erect, the whole skeleton of the tree showing even in summer through the sparse, small, nearly circular leaves which are placed remotely on the branches; in the autumn they turn clear bright yellow. In port and in the general appearance of its foliage, Cercidiphyllum, as it appears in the forests of Yezo, might, at first sight, be mistaken for a venerable Ginkgo-tree, which, in old age, has the same habit, with pendulous branches below and erect branches above; but the trunk and its covering are very different in the two trees.

Cercidiphyllum is distributed from central Yezo southward nearly through the entire length of the Japanese islands. At the north it grows at the sea-level and is very common, but on the main island it is confined to high elevations and is rather rare. Except in Yezo, it seldom grows more than twenty or thirty feet high, and I never saw it, except in that island, below 5,000 feet elevation, where, as at Yumoto, in the Nikko Mountains, it is scattered through the lower borders of the Hemlock-forest.

Cercidiphyllum is a valuable timber-tree, producing soft straight-grained light yellow wood, which resembles the wood of Liriodendron, although rather lighter and softer and probably inferior in quality. It is very straight-grained and easily worked, and in Yezo is a favorite material for the interior finish of cheap houses and for cases, packing-boxes, etc. From its great trunks the Ainos hollowed their canoes, and it is from this wood that they make the mortars found in every Aino house and used in pounding grain.

Seeds of Cercidiphyllum were sent to the Arnold Arboretum from Sapporo fifteen years ago, and there are now plants in the neighborhood of Boston nearly twenty feet high raised from these seeds. In New England Cercidiphyllum is very hardy and grows rapidly; in its young state it is nearly as fastigiate in habit as a Lombardy Poplar, the trunk being covered from the ground with slender upright branches which shade it from the sun, which seems injurious to this tree, at least while young. As an ornamental plant, Cercidiphyllum is only valuable for its peculiar Cercis-like leaves, which, when they unfold in early spring, are bright red, and for its peculiar habit, as the flowers and fruit are neither conspicuous nor beautiful.

C. S. S.

* By a slip Euptelia was included in the list of the endemic arborescent genera of Japan, printed in the first issue of these notes.

Foreign Correspondence.

The New Plants of 1892.—II.

Stove Plants.—There were no very remarkable plants among the new introductions from the tropics last year. Aglaonema costatum (Veitch) is a dwarf ornamental-leaved plant, green, spotted and veined with white, the leaves ovate, about five inches long; native of Perak. Alocasia Rex and A. nobilis (Sander & Co.) are promising additions to the many kinds of Alocasia in cultivation. Begonia decora (Veitch) is a prettily variegated little plant which is certain to become a favorite with those who are interested in the ornamental-leaved Begonias. Dracæna Sanderiana (Sander & Co.) is an elegant plant in the way of D. reflexa, with the leaves prettily lined with white on a green ground. Maranta Sanderiana and M. Mooreana (Sander & Co.) are distinct-looking additions to Calatheas, of which we

Fig. 9.—Cercidiphyllum Japonicum, in the Forests of Yezo.—See page 51.

already possess dozens of named sorts, some of which do not materially differ from each other except in name.

Nymphæa Laydekeri rosea has won golden opinions from those who have seen the few plants which we owe to American nurserymen. N. gracilis, although introduced for N. Mexicana, is worth a place in the aquarium, as it grows freely and produces numerous pure white, elegant, medium-sized flowers during the summer.

Monodora grandiflora is not new, but it flowered for the first time in cultivation last year at Kew. It is a small tree with stout branches and oblong glaucous-green leaves, which are reddish when young. The flowers are produced singly from the axils of the leaves on their drooping peduncles, and they are formed of three long lanceolate segments four inches long, colored exactly like the labellum of Oncidium Papilio.

Nidularium striatum (W. Bull) and N. Makoyanum (Sander & Co.) are pretty foliage-plants, particularly the former, which has strap-shaped, recurved, bright green leaves, conspicuously striped with creamy white.

Oreopanax Sanderianum (Sander & Co.) is a new species similar to Fatsia papyrifera, with tough, leathery, yellowish green, lobed leaves; it is a native of Guatemala.

The best (indeed, I believe, the only) new Palm is Ptychoraphis Augusta (Kew), which grows freely in a warm house, and is as elegant as Cocos Weddelliana.

Pandanus Baptistii (Veitch) and P. Dyerianus (Sander) are identical with P. inermis variegatus, introduced this year to Kew from Australia. P. Pacificus (Veitch) is a distinct-looking plant with broad, graceful, shining green leaves, the margins clothed with fine teeth, and the apex narrowed abruptly to a long tail-like point. It is said to be a native of the South Sea Islands.

Podocarpus pectinatus (Kew and Sander & Co.) is an elegant Yew-like plant from New Caledonia, remarkable for the coating of white waxy "bloom" on the leaves, which have in consequence a silvery appearance. The plant grows freely and is easily multiplied by means of cuttings.

Synandrospadix vermitoxicus (Kew) is a tuberous-rooted Aroid from Tucuman, with large annual heart-shaped green leaves, and a scape a foot high bearing an open ovate spathe six inches long by four inches wide, colored gray-green outside, tawny-red inside. Thunbergia grandiflora alba differs from the type, which when well treated is one of the most ornamental of stove climbers, in having pure white instead of blue flowers. Urceocharis Clibrani is one of the most interesting plants of the year. It is to be distributed by Messrs. Clibran & Son, of Altrincham, in Cheshire, in June next. As I have recently described this plant in Garden and Forest, I need only say here that it is a hybrid between Eucharis grandiflora (mother) and Urceolina pendula, and that it has all the vigor and much of the charm of the former, with flowers intermediate between the two parents. Tillandsia Massangeana, var. superba (Veitch), is a near ally of T. zebrina. It has broad recurved leaves colored apple-green, with transverse bands of deep chocolate. T. Mœnsii (Veitch) is somewhat similar to the last, but the leaves are veined and mottled with bright green on a yellowish green ground. Tradescantia decora (W. Bull) is an ornamental foliage-plant, with elongate lanceolate leaves colored olive-green, with a broad median line of silvery gray. Several other new kinds of Tradescantia will be mentioned under the list of plants introduced by foreign horticulturists.

Utricularia Humboldtii and U. longifolia are probably the largest-flowered and most beautiful species known. They were discovered by Schomburgk on the Roraima in British Guiana and described by him in his charming *Reminiscences*. They were introduced into cultivation several years ago, but not flowered before last year. U. Humboldtii has broad reniform leaves, four inches wide and a foot high when well grown. The flowers, which are larger than those of U. montana and colored pale lavender, are borne on graceful scapes. U. longifolia has strap-shaped leaves a foot long and short erect scapes of mauve flowers. These plants grow well in a warm, moist house, but they do not flower freely.

Hippeastrums, Streptocarpi, Begonias and Cliveas have been improved by breeders interested in these genera. A hybrid between Streptocarpus Galpini and a variety of S. Rexii, raised and flowered at Kew, promises to be a first-rate plant.

Greenhouse Plants.—Several new additions of more than ordinary promise are to be noted here. Taking the selection in alphabetical order, we have first the noble Agave Franzosini (Kew), which is of the size and stature of A. Americana, but the leaves are silvery. There is a description of it in the *Kew Bulletin*, 1892, p. 3, by Mr. Baker, taken from a specimen flowered in Mr. Hanbury's garden at La Mortola, Mentone. Aloe aurantiaca is another of Mr. Hanbury's treasures. It is intermediate between A. ciliaris and A. arborescens, a very free grower, forming a huge mass which in spring and summer is covered with crowded racemes of Kniphofia-like red and yellow flowers. Cyrtanthus Galpini (Kew) is likely to rival Vallota purpurea in the size and color of its flowers. Richardia Pentlandii, which is the best of the yellow-flowered "Callas," I have noted several times recently. It is certain to become as great a favorite as the common Arum Lily. Several other so-called yellow-flowered kinds have been advertised, but they have not yet been proved. Rhododendron racemosum (Veitch and Kew) is a charming little species, dwarf as the Cowberry (Vaccinium Vitis-idæa), very free-flowering, and pretty in the form and color of its flowers. It may prove hardy in the warmer parts of England. Senecio Galpini (Kew), from the Transvaal, is a Kleinia, with glaucous leaves on branched stems, less than a foot in height, bearing erect terminal heads of bright orange flowers. Tacsonia Smythiana is a supposed hybrid, but, as I have recently stated, it is remarkably like T. mollissima. Trichodesma physaloides (O'Brien) is an interesting and ornamental Borage wort from South Africa, with a fleshy root-stock, annual stems, glaucous green leaves, and large pure white bell-shaped flowers in erect branched racemes. Unfortunately it has proved hitherto bad to establish. Vernonia podocoma (Kew) is a tree-like composite from south Africa, with large leathery foliage and a huge terminal panicle of rosy purple flowers. Yucca Hanburyi is a new species described by Mr. Baker from a plant at La Mortola. It has the habit and appearance of Y. angustifolia, the leaves being linear, green, rigid, with a yellow-brown edge and curling filaments; raceme simple, one and a half feet long, bearing white campanulate flowers two inches long.

Ferns.—There are no new species of Ferns to record for last year. These plants do not now receive much attention from horticulturists. Hardy kinds, and particularly the rarer varieties of British Ferns, are increasing in popularity, and in consequence of high cultivation they are most prolific in the production of what are called sports, a number of which have received certificates this year. Among the exotics we have the variegated variety of Adiantum macrophyllum, which obtained a certificate this year. Pteris tremula variegata is a pleasing variation of one of the most useful of Ferns, and P. Regina and P. cristata are sports from the ornate P. Victoria-regina, introduced by Mr. Bull several years ago. Woodwardia radicans, var. pendula, is not unworthy of a place among basket Ferns for the conservatory.

Hardy Plants.—There are a few promising new herbaceous plants and two or three trees and shrubs, but the list is, on the whole, meagre. Allium Kansuense (Kew) is a pretty species allied to A. cœruleum, but dwarfer and with larger heads of nodding deep blue flowers. It has been introduced from China through St. Petersburg, and was one of the prettiest of the rockery plants in flower at Kew last July.

Aquilegia Transylvanica (Kew) has large purplish blue flowers on branching stems two feet high. Astilbe Chinensis (Kew) resembles Hoteia (Astilbe) Japonica, but the flower-heads are looser and the flowers rose-colored. Calo-

chortus amœnus, C. flavus and C. Kennedyi are three pretty additions to this genus, the last-named being exceptionally brilliant in color, that is, bright scarlet, with black-purple basal spots. Chionodoxa Luciliæ, var. Alleni, is a beautiful large-flowered variety, and Chrysanthemum rotundifolium (Kew) is a Transylvanian species, two feet high, with numerous white flowers an inch across. One of the very brightest-colored of the pinks is Dianthus callizonus (Kew). It is only six inches high, blooms in July, is tufted, with glaucous foliage, and flowers two inches wide of the brightest rose-purple, zoned with a darker shade. It also is Transylvanian. Emmenanthe penduliflora (Veitch & Sons) is a Californian annual, a foot high, which in July is covered with nodding, bell-shaped, creamy yellow flowers. Iris parabid is a hybrid between I. Iberica and I. paradoxa, raised by Professor M. Foster, and I. Nepalensis, var. Letha (Foster), is a pretty plant with fragrant flowers.

There are three new additions to Kniphofia in K. modesta (Kew), an elegant plant with grassy leaves and spikes of white flowers two feet high; K. Nelsoni, a new species with brilliant scarlet flowers on scapes two feet high, and K. pauciflora (Kew), also grassy-leaved, and remarkable for its loose racemes of pale yellow flowers. Nemesia strumosa (Sutton & Sons) is a bright-colored Cape annual of extraordinary attractiveness. I have lately described this in GARDEN AND FOREST. Ranunculus Carpathicus, from Hungary, is a showy perennial a foot high, with palmate leaves and golden yellow flowers two inches in diameter. Tchihatchewia isatidea is a badly named beautiful-flowered perennial Crucifer, and bears its racemes of bright rosy pink fragrant flowers in May. It was introduced by Max Leichtlin from Armenia. Thalictrum rhyncocarpum (Kew), from the Transvaal, is an elegant plant, three feet high, with Maidenhair-like foliage.

Buddleia Colvillei is a beautiful Himalayan shrub which has been brought into prominent notice by Mr. Gumbleton, in whose garden at Cork it flowered profusely last year. It has loose racemes of large rose-colored bell-shaped flowers. It is scarcely likely to be hardy except in favored parts of England. Cornus Kousa, Amygdalus Davidiana, var. alba, and the white variety of Wistaria Sinensis, received certificates last year, but they are not really new additions, although as yet little known. The varieties of Camellia Sasanqua, shown in December by Messrs. Veitch & Son, and said to be quite hardy, are of sufficient interest to be included here. There is apparently a good opportunity for a nurseryman who would interest himself in the introduction of new trees and shrubs for the outdoor garden.

London. *W. Watson.*

Cultural Department.

Irises and Their Cultivation.—VII.

IN the change of fashions and tastes in matters horticultural, plants which have continued to interest successive generations of gardeners, at least as long as the garden has had a literature to make records, are few in number. One of the plants to continue in favor is the Mourning Iris, I. Susiana, which seems to-day as interesting to the owners of the best gardens as when it was first introduced from its eastern home. The interest in I. Susiana has also been increased rather than lessened by the discovery and introduction within recent years of other species of the same group, the Oncocyclus, and an allied one, the Regelia, among which may be found the most beautiful, if not curious, flowers in the large family. Some cultivators, with favored conditions of soil and climate, seem to have little difficulty in flowering I. Susiana and I. Iberica, the other best-known member of the group, but these fortunate gardeners are few. Probably a number of the rhizomes sold by the plantsmen each year flower the succeeding spring, but only to disappear or dwindle in the following season. Under the glass of a cold frame or cool house the plants are not specially difficult ones to grow, but they are perfectly hardy, and the open border seems the place for them. A well-grown and well-flowered group of these plants in the borders in early May would be as interesting and enjoyable as it would be rare, and, perhaps, unique, for they are plants which require a distinct resting season and careful treatment, and are among those which test the ability of the most skillful cultivators.

For their culture one cannot do better than follow the directions of the master-gardener, Max Leichtlin, who probably first reduced their flowering to some certainty. These directions should have double weight, in the words of Professor Foster: "I place them in the sunniest, driest spot I have, in sandy or rather gritty, but fairly rich, soil, planting them, if possible, in the beginning of August, putting them in dry, and never letting the watering-pot touch them. At the end of May or beginning of June I put a light over them, but not round them, letting the air have free access beneath the glass to the plants, but shutting off all the rain. I keep the light on until the end of July or beginning of August, varying the exact time according to the state of the weather and the forwardness of the plants. Then the lights come off, and the plants are left exposed to wind, rain, frost and snow until the following summer, though, perhaps, during a wet November I ward off the excess of rain for a few weeks. If I leave the plants exposed to the freaks of an English summer they linger on flowerless for a while, and after a time they are no more." These are simple directions, and should probably produce satisfactory results in this country, but I have found that a good covering of hard leaves is desirable, for our winters are very capricious, and the great changes of temperature, especially in a warm corner, injure the foliage so much that they fail to recover. If March especially could be dropped from the calendar we could grow a number of hardy things more successfully. However, I do not claim much progress with my collection of these Irises, and only desire to indicate the lines on which success may be expected, and call attention to the wealth of material ready for those who have a fancy for rare, curious and beautiful flowers to be had at a considerable expenditure of care and patience.

Baker enumerates twelve species of Oncocyclus Irises, and it seems desirable to note them as I. Susiana, I. Gatesii, I. Bismarckiana, I. Heylandiana, I. Lortetii, I. Sari (and var. lurida), I. Haynei ("perhaps not distinct from I. Sari"), I. lupina, I. Helenæ, I. Iberica (var. Perryana, var. ochracea, var. Bellii and var. Van Houttei, the last a hybrid), I. acutiloba, I. paradoxa (and var. violacea). To these may be added I. Mariæ, sent out by Herr Leichtlin this season. I. Nazarena seems to be a synonym of I. Bismarckiana. There are others—I. atropurpurea, Baker, and var. Odysseus—bought as Oncocyclus Irises, but they are yet unflowered by me, and of their places I am not sure.

When the Russians advanced into Turkestan one of the minor results was the discovery of a new section of Irises, General Korolkowi, the war governor of the district, having in 1872 sent home from eastern Bokhara, among other valuable plants, rhizomes of the Iris now known by his name. This is a species distinct from, but nearly allied to, the sub-genus Oncocyclus, and was determined by Professor Foster, and made a sub-genus as Regelia. After this followed a few other species and varieties of the same class. These are I. Leichtlini and var. Vaga, I. Suwarowi and var. lineata, I. Korolkowi and vars. violacea, concolor, venosa, venosa pulcherrima, Leichtliniana and I. Barnumæ. These require the same culture as the plants of the previous section. Many, if not most, of these plants are obtainable from dealers. None of them are without great beauty. Asia is the home of all these Irises, missionaries and Russian generals seeming to be the usual collectors. Some one was quoted in GARDEN AND FOREST a few weeks since as objecting to a Muscovite name of an Iris. After the magazine horrors of many months, it is to me distinctly pleasing to see the Russian names on my labels, and to feel that, perhaps, the Muscovite is, after all, not without his finer traits when even their hard fighters seem to find time for the beauties of nature.

Elizabeth, N. J. *J. N. Gerard.*

Autumn-flowering Lilies.—II.

LILIUM PARKMANNI is a hybrid produced by crossing L. auratum with a dark flowered form of L. speciosum. It approaches closely the form Rubro-vittatum, the latter being actually the better of the two. L. Krameri, if not quite like L. auratum, is very closely allied to it, requiring the same treatment. The stem is very slender, smooth, tinted purple, while the leaves are lanceolate, smooth, dark green, often tinted purple, the flowers large, broadly funnel-shaped, pinkish purple, or delicate pink, sometimes almost white. They are strongly scented. The cultivator will find the same difficulty with it as with L. auratum. As L. Krameri blooms early, seeds will ripen in this country, and although I have not succeeded in crossing it with L. speciosum, it readily crosses with L. auratum, showing by this an affinity to the latter species. A

few years ago a stem was shown in London with several very large flowers of a pale rose color, the whole appearance of the plant resembling L. auratum as much as L. Krameri, but the bulb resembled that of the former more closely. Unfortunately the two plants have suffered so much that they have not flowered for the last two years.

Lilium speciosum Group.—Lilium speciosum is of the utmost value wherever cut flowers are required, as it is equally well adapted for pot-culture or the open border, and as long as the soil is neither too dry nor too damp there are few places where the bulbs will not grow. If wanted for early flowering, bulbs should be potted in October, without injuring the roots much, and then plunged in a cool frame during the winter. Early in the spring, when well-rooted, they might be moved at first to a cool house and later on to a temperate house and forced into flower. Those for the open border can either be planted during the autumn or winter, and as late as March if the bulbs are not shrivelled up and the roots have been kept growing. The best material to preserve them in is cocoanut-fibre. L. speciosum (or L. lancifolium as it is often incorrectly called) is usually divided into sections. Those with green stems are put under var. Album, and those with a purplish tinted stem under var. Rubrum. It is, however, difficult to draw a line, especially as many of them are crosses between the two and belong as much to one as to the other. L. speciosum roseum has a stem from two to three feet in height, the flowers of a delicate rose-spotted crimson. Of these we have several very beautiful forms, the principal being the following: Album Krætzeri, which has white flowers, the segments being marked with green mid-ribs. Album verum, which is synonymous with Album novum, and Album vestale, which flowers a week or two earlier than Krætzeri and has broader leaves, larger and broader segments, with less green. Album punctatum has the same bulb and leaves as the last, the flowers being white, dotted delicate rose and tinted pale rose. Rubrum has reddish-tinted flowers, the stem green tinted with purple, leaves dark green, often purplish tinted. The outside segments of the flower are more or less shaded with rose or red. The intensity of the coloring depends much upon the strength of the plant and upon the weather, a sunless autumn meaning paler-colored flowers. I have often seen flowers of the common Rubrum sent from the south having a deeper color even than the variety Melpomene purpureum, or even Cruentum. Roseum, properly speaking, is only a poor Rubrum with paler-colored flowers. A form sold under the name of Roseum verum, though having greenish purple stem, has pale rose flowers with white edged segments, dotted purple, the pedicels being much branched and twisted. Purpureum has a slender stem from three feet to five feet high, the flowers large, rose-tinted, and dotted with intense purplish crimson, the segments irregular, recurved. Melpomene has a large, but less pointed, bulb than Purpureum, the flowers large, rose in the centre, tinted and dotted with deep crimson, the exterior purple. Cruentum differs by having a straight stout stem, short lanceolate leaves, and deep-colored flowers, the outside being rich crimson-purple. Multiflorum, or Schrymackersi, is almost like Rubrum, but flowers a week earlier. The bulb is in proportion smaller but well shaped.

L. speciosum and its numerous forms flower from the beginning of August till the middle of October, the first in bloom being Album verum and Multiflorum, the last Purpureum and its allied forms Melpomene and Cruentum. Besides forcing them earlier into bloom, there is also a way of retarding them, which is done by keeping bulbs out of the ground till March in a dry, cool and airy place, laid in cocoanut-fibre. They are protected from rain and sun, and must, of course, not be allowed to shrivel. Imported bulbs flower also much later the first year.

L. Henryi properly belongs to this group, the whole character of the plant being like that of L. speciosum, except that the flowers are apricot-colored or orange-yellow. It is a most beautiful, but at present very rare, Lily. It flowers in September, and is a native of China.—*G. Reuthe, in Gardeners' Magazine.*

Some American Bulbs.

THE bulbous flowering plants of Mexico, as a rule, do much better in our northern climate than those of California and Oregon. The collected bulbs, after a year's growth in good rich soil, double, and often treble, in size, producing larger and more abundant flowers. Our soil seems to suit them exactly, as also our climate, so far as summer is concerned, but our severe winters would, no doubt, be too much for them unless they were entirely protected from frost. When well-ripened off and properly dried their bulbs winter well indoors, most of them nicely in any dry cellar, and the Tigridias in a dry warm place.

The number of Calochortuses in Mexico is small, as compared with those of California, but they are attractive, and do finely. Not only do the bulbs become larger when grown here, but they seed freely, and some of them multiply fast by the little bulblets borne in the axils of their leaves, as with Lilium tigrinum, only in much greater profusion. The best Calochortus I have seen from Mexico, and, as well, the best from any locality, is C. Bonplandianus. The large, dark purple, bell-shaped flowers are borne in greater profusion, I believe, than those of any other species. C. flavus, which is another name for Cyclobethra flava, is also a fine species, and so is C. Madrensis.

These Mexican bulbs all do best planted in spring, and seedsmen who handle these and the California bulbs, I believe, place all the Mexican bulbs in their spring catalogues, and all those from California and Oregon in their autumn lists. Milla biflora, which was not common ten years ago, has won its way into almost every catalogue of flowering bulbs in the country. It is easily grown in any ordinary garden soil and, unlike most bulbs, does not have to be replaced every year. The Tigridias too, with half a chance, are sure to give satisfaction. Bessera elegans has never matured here, not so much because of our short season as that it is so late in starting. It may be planted very early and not come up perhaps until July. There is then not sufficient time before frost for it to mature. When the bulbs do not mature it is difficult to keep them over. This is the only species of Mexican bulbs that has not done well here. Nemastylis brunnea, though it does not multiply, grows much larger flowers and bulbs than the collected ones. The Cooperyas also thrive in our northern soil and the Zephyranthes all produce much larger bulbs. The bulbs of Cooperias and those of the various species of Zephyranthes, if well dried, keep perfectly well in any ordinary cellar.

The various species and varieties of Calochortus from California and Oregon have never done as well with me as those from Mexico. When wintered in a cool cellar, if above the freezing point, they begin to grow in February. By the time the weather is sufficiently warm to plant them out they have become so weakened by this growth that they do not amount to much. The only way is to plant them in autumn and protect them, when good bulbs will flower the first season at least. They do not, however, increase in size like the Mexican bulbs, but, on the contrary, they decrease. C. longibarbatus has done the best with me of any from the Pacific coast and C. Benthami next best. I am not satisfied that they cannot be successfully grown here. The trouble is that they are so early. If they were in frames covered with glass I believe they would do much better.

The Brodiæas do better. They not only seem to hold their own so far as size of bulb is concerned, but they multiply by offsets and flower quite freely. A clay loam seems to suit them. Brodiæa grandiflora, B. ixioides and B. stellaris are among the best. B. coccinea is very attractive, but it is not so thrifty here as some of the others.

The Erythroniums do nicely here. They should be planted out by the last of August, that they may become well-rooted before winter. E. grandiflorum has several varieties, all very firm. One of the best of these is the one from Oregon, sometimes called E. giganteum. It has large nodding creamy white flowers. E. Hendersoni is a very handsome species from Oregon, but not so robust as some of the others.

The Frittillarias are pretty and easily managed in the same beds with Brodiæas and Erythroniums. F. recurvæ, with its orange-red lily-like flowers, is the best. The little F. pudica, producing its little yellow flowers so early, is also valuable.

The California Lilies are among the best of the genus. Lilium Washingtonianum is a little difficult to manage. It needs time to become established and to have protection in winter. L. Parryi, with its canary-yellow flowers, is quite easily managed. Any of these Lilies, planted in well-drained soil, four or five inches deep, mulched with two or three inches of peat, will thrive. Perhaps L. pardalinum is the hardiest of the California species, but if L. parvum or L. rubescens are planted in sandy loam, they will thrive. L. Columbianum is a fine plant, with its spotted recurving petals; it has done better with me in clay loam than in sand. L. Humboldtii needs two years to establish itself before it does its best.

Charlotte, Vt. *F. H. H.*

Grevillea robusta.—This has proved to be a very satisfactory plant for the conservatory. I put a strong specimen in the ground of a house having no centre bench, where it rooted

freely and grew to the glass fifteen feet above, bearing a magnificent crop of its fern-like foliage and it has gained much admiration. The leaves have a much longer life than would be supposed from the appearance of the plant. There are now on the tree, in good color and health, leaves that were developed over eighteen months ago. This, of course, is on a thrifty plant. Having seen the tree in flower in California I have been endeavoring to secure some of the beautiful racemes of orange-colored blossoms upon this plant. Some of its side branches have been girdled and others bowed in with the hope of developing flowering wood.

State College, Pa. *George C. Buts.*

Correspondence.

A New Plant Label.

To the Editor of GARDEN AND FOREST:

Sir,—Garden-labels are always necessary in a collection of plants, but they are always a care, and usually a disfigurement, especially when the plants to be identified are small and numerous.

No one label is adapted to all the requirements of a garden, and there is seldom a design which proves as satisfactory in service as it appears when first devised. Every gardener has memories of labels which have been heralded as perfect, but which have proved delusive. The usual experience is a return to a painted wooden label of suitable size, generally too conspicuous, but if of the right kind of wood, proving fairly durable and legible for a season or two. It is a great tax on one's time and patience, however, to keep a quantity of the best wooden labels in good order. There has always been desired a large permanent label, not conspicuous, but carrying a legible name in characters which can be removed or altered when necessary, and so substantial as not to be broken by a blow, and able to keep its place firmly during frosts and thaws. This want seems fairly met by the label illustrated on this page, samples of which have been sent me by Mr. John Wood, of Kirkstall, England, the well-known hardy plantsman, who is the patentee. The label is stamped from pure zinc, a metal which proves practically indestructible in the weather. The oval head, one and a quarter by three inches, has a rim on the reverse, making a stiff firm plate; on this the plant name is written with suitable ink, or if painted, a soft pencil mark will be fairly permanent. This plate slopes back so as to make an angle of about sixty degrees with the upright shank. This shank, which is eight inches long, is braced and stiffened by being bent through its length, as shown in the figure, so as to form two sides of a triangular prism; it is practically rigid, and yet sharp and thin enough to enter the ground easily. Being stamped out of a single piece of metal, there is nothing about it to get out of repair.

Fig. 10.—An English Plant Label.

Owing to the slope of the plate it is easy to read the legend without stooping to its level. The writing can be erased readily with sand-paper. This label seems to possess, in short, the qualities of permanence, simplicity, indestructibility and legibility. Owing to the present high duty on zinc, these labels are fairly expensive, costing over $5.00 per gross; considering, however, that they are indestructible, this cannot be considered prohibitory where the best is desired.

Elizabeth, N. J. *J. N. Gerard.*

The Old Hedge-rows on Long Island.

To the Editor of GARDEN AND FOREST:

Sir,—If one whose acquaintance with the country had been formed in the western or central states, or even in western New York, were to drive through that portion of Long Island which lies east of Riverhead, he would see much that was new, strange and interesting. First, there are the old farm-houses, roomy, comfortable-looking buildings, covered with shingles both on roof and sides, and very different in expression from the smart modern houses on the newer farms. Many of these buildings are very old; at least, for America. One at Southold, which was built in 1647, was torn down last fall, and we can scarcely go a mile without seeing some that were built 100 to 150 years ago. Around the old house are clumps of Lilac and other shrubs which are so old as to seem quite distinct from the more common younger forms, while the great barns and wide yards have an expression of open-handed hospitality which is delightful to see. Formerly the dividing lines between farms were marked by hedge-rows of a peculiar and distinct character, and they are worthy of particular attention now, as they are rapidly being rooted out, and a few years hence hardly one of them will be left. These hedges are formed by lopping down Oak or other trees and forming with their stumps, trunks and a few rails a sort of a fence at first. Sprouts from the lopped trees are then allowed to grow up, and, with briers and vines, form a thicket or hedge often a rod through. After a few years the sprouts are again lopped down and trimmed, and this process is repeated until the original stumps come to be five or six feet in diameter in the line of the row, although not more than one or two feet in the other direction, and exhibit most picturesque forms, the result of their mutilation and of natural grafting. However unprofitable and shiftless these old hedge-rows may be from an economic point of view, they are often exceedingly beautiful, not only of themselves, but in their effect upon the landscape, and a study of them can scarcely fail to furnish the landscape-gardener most valuable hints in arrangement and combination.

Detroit, Mich. *Will. W. Tracy.*

Meetings of Societies.

The Western New York Horticultural Society.—I.

THE thirty-eighth annual meeting of the Western New York Horticultural Society was held at Rochester last week, and the proceedings were interesting, as usual, and conducted with that peculiar dash and promptness which characterizes this body. The address of the President, Mr. William C. Barry, who was re-elected for the following year, was very comprehensive and covered an unusual range of topics, including the experience of the year with insecticides and fungicides, the discussion of methods of marketing fruits and the systematic distribution of them so as to secure remunerative prices, the prospects of securing a market abroad, good roads, the proper use of farm-lands, and many other subjects. In speaking of the necessity of education for the farm and garden, Mr. Barry said:

At no period in the history of this country has it been so apparent, even to the indifferent and careless observer, that the cultivator of the soil must possess more than ordinary intelligence in order to succeed. Competition is so keen on every side that every acre of land must be productive. Even in this particularly favored state, famous the world over for remarkable climate and fertile soil, there are now thousands of acres of waste land which should be reclaimed and cultivated, hundreds of farms impoverished and unproductive which should be made to yield good crops, innumerable orchards which are too old and going to decay which should be uprooted and replaced with young, thrifty, fruitful trees. I am aware that the members of this progressive organization are not to be counted among those whose surroundings are of the nature referred to, but it is our duty as intelligent cultivators not only to do well ourselves, but to encourage others to do likewise. The influence of educated labor is one of the requirements of the times, and the agricultural school is one of the most efficient agencies for developing the resources of the state. The advancement of agriculture means the advancement of civilization. The farmer and fruit-grower of to-day need far more information than they did in the past. Labor-saving implements are now so numerous that the old-time drudgery of farm-work is no longer experienced, and some time is afforded for reading, study and improvement. I, therefore, ask the members of this association who have sons intending to take up agriculture or horticulture as a life-work, to permit them to take advantage of the opportunities afforded at the colleges of agriculture, and thus become intelligent cultivators of the soil, and scientific and skillful farmers and fruit-growers. Not

only will they as individuals reap incalculable benefit from such a course, but the people of the state as well. Experiments must be carried on by some one; individuals certainly cannot bear the expense; hence, if the state or national government is unwilling to appropriate the necessary funds, the work of scientific investigation cannot be thoroughly done.

The work carried on at these stations is such that it is well-nigh impossible to obtain immediate results. Much time is required to make accurate and reliable investigations and experiments, and as all of the stations are comparatively young, it is not fair to demand too much of them at present. Ten years hence, when the stations are well under way, their importance will be universally recognized, and then there will be no difficulty in obtaining appropriations ample for their work. I call upon you, members of this society, to exert all the influence you possess to secure for this state institution the funds it needs.

PREVENTION OF APPLE-SCAB.

Professor S. A. Beach, of the Geneva Experiment Station, after naming some twenty preparations which had been tested as preventives of Apple-scab, continued in part as follows:

Of the many fungicides thus far tested for Apple-scab, the copper mixtures have undoubtedly given the best results, but some of them are liable to injure the foliage. The ammoniacal solution of copper sulphate has proved decidedly beneficial in several experiments. It does not injure the foliage, and it also has the advantage of being readily prepared and easily applied, but when mixed with Paris green or London purple it is liable to injure the foliage seriously. Therefore, if this solution is used, it is necessary to make separate applications of Paris green or London purple for the codling-moth.

The strong Bordeaux mixture (six pounds copper sulphate, four pounds lime and twenty-two gallons water) is more expensive than the ammoniacal solution of copper carbonate, and it is not so readily prepared or so easily applied as that solution. But dilute Bordeaux mixtures, which contain from two to four pounds of copper sulphate for twenty-two gallons of water, have given practically as good results as other fungicides and are more easily applied than the strong mixture. They are also less expensive than the ammoniacal solution of copper carbonate. All Bordeaux mixtures have these advantages, namely, that they compare favorably with any other fungicide so far as efficiency is concerned, that they do not injure the foliage, and that Paris green or London purple in the proportion commonly used for the codling-moth may be mixed with them without any fear of injurious results. Where orchards are badly infested with the codling-moth, it is best to apply Paris green or London purple immediately after the petals fall, and follow with two more treatments at intervals of about ten days. Since the Paris green may be mixed with the Bordeaux mixtures, it is readily seen that such a combination will save the labor of three applications as compared with the ammoniacal solution of copper carbonate, with which the application of Paris green must be made separately.

A few weeks ago a circular letter was mailed to each experiment station in those sections of the United States where apples are grown extensively, requesting the station horticulturist to state what remedies had been used for Apple-scab during the present season, and with what success. The verdict of the replies was almost unanimous for Bordeaux mixture for Apple-scab, and usually a dilute formula was particularly specified. Ammoniacal solution of copper carbonate and modified eau celeste also received favorable mention in two or three instances.

After describing the simplest way of preparing the mixture and the best method of applying it, Professor Beach said: The true improved Vermorel nozzle is considered best for applying the Bordeaux mixture, better than the modifications of it which are sometimes offered. It forms a perfect spray, is easily cleaned when it becomes clogged, and uses the fungicide in a very economical manner.

The cost of spraying for both Apple-scab and the codling-moth for the entire season will vary from fifteen to twenty-five cents a tree, according to the skill of the operator, the kind of tools used, the kind of fungicide selected, the cost of materials and the number of applications. At the Geneva Experiment Station, even under the unfavorable conditions of the past season, three treatments of five Fall Pippin trees with the ammoniacal solution of copper carbonate and two treatments with Paris green apparently reduced the scab on the foliage thirteen per cent.; on the fruit, four and seven-tenths per cent., and the worminess of the fruit, twenty and eight-tenths per cent., as compared with six untreated trees of the same variety, making a total increase of twenty-five and five-tenths per cent. in the first-class fruit, seemingly due to spraying. Much more favorable results were secured from the same treatment on Roxbury Russets and Golden Russets, but it not best to exaggerate the benefit of this particular treatment by selecting exceptionally good results for the purpose of illustration. There can be little doubt that better results could have been secured by varying the time and increasing the number of the treatments in the manner hereafter recommended. Even this low per cent. of gain in first-class fruit will more than pay for the expense of treatment.

In the light of our present knowledge of the nature of the Apple-scab fungus, and guided by personal experiments and those of other investigators, the following line of treatment is suggested:

After the buds open and before the first leaves are half-grown, make the first application, using either the ammoniacal solution of copper carbonate or dilute Bordeaux mixture. Mr. D. G. Fairchild found, last spring, that the Pear-scab infection begins before the blossoms open, and the writer found that the same thing is also true with Apple-scab. The foliage and the calyx and pedicels of the unopened flower-buds become thus early infected with the scab fungus. Spraying at this time is therefore considered very important. The second application, using the same fungicide as before, should be made after an interval of ten days, and shortly before the flowers begin to open. The third application should be made immediately after the blossoms fall, using also at this time Paris green or London purple for codling-moth. Many prefer to use the dilute Bordeaux mixture at this time, because Paris green can be added to it without fear of injurious results, whereas if the ammoniacal solution of copper carbonate be used the Paris green must be used by itself. A fourth application should be made after an interval of from ten days to two weeks, using the same material as before, including the Paris green.

After another interval of from ten days to two weeks make a fifth application, using the same material as before, including the Paris green. If it is desired to make further treatments after this time the Paris green may be omitted.

BIRD NOTES FOR HORTICULTURISTS.

This was the subject of a most interesting paper by Walter B. Barrows, Assistant Ornithologist of the United States Department of Agriculture. The greater part of it is here reproduced:

The interrelation of birds and horticulture is a many-sided problem, one requiring for its complete solution a larger array of facts than has been made yet, and a more careful study of these facts than most people imagine to be necessary. No well-informed person can doubt that, as a whole, birds are beneficial to the agriculturist, yet many a farmer and fruit-grower has a strong feeling that he bears more than his share of the damage inflicted by birds, and receives less than the average of benefit.

It is useless to deny that fruit-growers suffer a direct loss each year. It is equally useless, in the present state of our knowledge, to attempt to demonstrate that the particular birds which cause this loss make any satisfactory return. In some cases a considerable offset to the harm could be shown, but the exact amount of the credit could not be determined, and in many cases it would be difficult to show any compensation to the loser. As a rule, the larger the area of any one cultivator, and the greater the variety of the crops grown, the smaller will be the relative loss and the larger the direct compensation for the harm done. An example may make this point clearer. Suppose a man to cultivate 100 acres, giving a fair proportion to vegetables, small fruits, orchards and vineyards, with shade-trees and shrubberies, and a little lawn or pasture. Ignoring the English sparrow, almost the only loss occasioned by birds will be in the damage to cherries, strawberries, raspberries and grapes, and this will be caused mainly, or entirely, by four or five species of birds, probably the robin, cat-bird, cedar-bird or cherry-bird, red-headed woodpecker and Baltimore oriole. Purple finches (red linnets) may cause annoyance by nipping the flower-buds of choice Cherries and Pears early in the spring, orioles and grosbeaks may destroy some Peas, and the goldfinch or yellow-bird may eat and scatter the seed of Lettuce, Turnip and Cabbage; but these are minor and irregular thefts, and ordinarily not worthy of notice.

Except in the case of grapes the harm will he done mainly during June and July, and nearly all the marauders will be local, that is, birds with nests in the immediate vicinity, and will obtain all the food for themselves and their young from the same farm. Cedar-birds are great rovers and very possibly may

come from a distance for their fruit, but even in that case they are sure to eat something else belonging on the farm. Now, no one of the species mentioned, even when adult, feeds exclusively on fruit, and the young get far less fruit than the old birds. On an average, at least two-fifths of the food of old and young consists of insects, even during June and July, and many of these are decidedly harmful insects, so that certainly some good is done by their destruction, and whatever the amount may be, it should go to the credit of the birds as helping to balance the account for fruit stolen from the same premises. So long, therefore, as the amount of harm done is not very great, and the amount of good is uncertain, a truck farmer or market gardener might reasonably be asked to tolerate the birds. On such a farm as has been instanced, they may be looked upon as a class of laborers working for their board and probably earning it, although, unfortunately, they insist on selecting their own food, which is seldom done in an economical manner, and often in a way very annoying to their employer. If, on the other hand, we consider the effect of fruit-eating birds on a farm of similar size given entirely to small fruits, including grapes, the conditions are somewhat different. The losses are fully as great, and the compensation less. True, the farm itself will offer few suitable locations for nests, and its more central portions will suffer less from the inroads of birds from neighboring groves and orchards; but for this very reason its edges will sustain more injury, and the return made in the destruction of injurious insects will be made almost entirely to the owner of the nesting-grounds instead of to the fruit-grower. The marauders may do some good, incidentally, to the owner of the fruit, but the bulk falls to his neighbors who have less fruit and a greater variety of other crops, and it does not seem just that he should support these birds—so far, at least, as half their food goes—and get practically no good in return. On the other hand, it may be fairly asked, whether he has the right to kill them, even in defence of his own crops, thus depriving his neighbors of the good they have been receiving.

Such preliminary studies of the food of our native birds as have been made thus far show it to be highly improbable that any species ought to be exterminated altogether. It is absolutely certain that our native birds, taken as a whole, do more good than harm, and in the present state of our knowledge it would be unwise to recommend the wholesale destruction of any. It does not follow, however, that the good done to any one farmer or fruit-grower will equal or exceed the harm done him, though this is probable in most cases where the acreage is large and a fair variety of crops is grown. It should be noted that, in the supposed cases cited above, no mention was made of the other common birds of farm and garden which do not eat fruit or grain to any appreciable extent. Among these might be mentioned the warblers, chickadees, wrens, song and chipping sparrows, swallows, cuckoos, flycatchers, smaller woodpeckers and others, most of which are distinctly beneficial whenever and wherever found. It also should be borne in mind that the species mentioned as most addicted to fruit-stealing are injurious only during three, or at most four, months of the year, although all are present and perhaps actively beneficial during at least one or two months, and some, as the robin and cedar-bird, during the larger part of the year.

It is very clear, nevertheless, that fruit-growers are likely to suffer more in proportion than other farmers from the attacks of the birds, and it is but fair to consider the possible means which can be taken to prevent, or at least to lessen, this loss as much as possible.

Shall we shoot the birds?

In my belief this should be one of the last resorts. From what has been said already, it is clear that most birds are too valuable to be killed; but, aside from this, their shooting would be both expensive and unlawful. The imported nuisance, the English sparrow, ought to be killed whenever it is possible, but this can be done most effectively by other means than shooting, particularly by poison in cold weather, and the destruction of nest and eggs in the summer. Air-rifles and light collecting guns might be used on English sparrows under some circumstances, but even if the ammunition costs nothing the time required makes the process expensive.

As to other fruit-eaters, three classes of treatment may be considered.

1. The fruit may be protected by nets or similar devices, which mechanically keep the birds from the fruit. This method is expensive, but sure.

2. The birds may be frightened away by the use of such devices as are commonly called scarecrows, or by the presence of boys, cats, or other animals. Scarecrows are inexpensive—but commonly also ineffectual. On a large scale the employment of men or boys becomes expensive, unless they are actual pickers—and often the most critical time is when the fruit is beginning to ripen, and not ready to be picked.

3. Perhaps a counter-attraction may be given the birds—a fruit which would attract and satisfy them, though worthless or nearly so to the fruit-grower.

Methods coming under the first head are too expensive, generally, to be applied to any considerable area, the cost of the nets being the most important item. It is probable, however, that a net with a very large mesh—large enough to let a robin through easily—would be just as effectual as one with a close mesh. Remembering the fact that crows are kept away from corn-fields with more or less success by one or more white strings stretched across and around the field, it seems probable that if one set of these strings were put closer together, and another series stretched at right angles, the practical effect of a net would be gained, although the mesh might be very large; the larger size which would answer being determined by experiment. By using a cheap white twine, and stretching it between temporary stakes set about the edges of the field, no doubt, strawberries, raspberries and blackberries could be protected almost completely, and at a cost which would be very moderate compared with the use of actual nets. Whether the same method could be applied advantageously to Cherry-trees would depend somewhat upon their size and location, but in any case the meshes would need to be smaller and the labor and expense of putting up poles for a frame-work and stretching the twine would increase the cost materially.

Under the head of scarecrows it may be well to consider the actual enemies of wild birds as well as effigies of them, which commonly do duty in berry patches and orchards. It is not probable that the common cat can be utilized to any extent as a scarecrow, but it has been demonstrated beyond question that a living hawk, confined only by a thong about the foot and placed conspicuously, will prevent absolutely the approach of birds over a considerable territory. Even a stuffed hawk is perfectly effective for a day or two, and by shifting it from one position to another, or by having several individuals of different sizes and kinds, the protection of a large area can be assured. This method also is somewhat expensive, but the hawks need not be of the largest size nor mounted in the highest style of the art, although good work will deceive the birds longer than poor work. If the mounted specimens are well cared for they should last several seasons.

The possibility of providing a special supply of fruit for birds, and thereby preventing their depredations on the more valuable kinds, has been recommended many times by horticulturists as well as by ornithologists. The great trouble is to find a fruit which is early enough to protect early cherries and strawberries, and attractive enough at all times to compete in the birds' favor with fruits more valuable to the grower. The typical fruit of this kind should also be a profuse bearer, should remain a long time in season, and be hardy enough to thrive anywhere without much care. It is needless to say that, as yet, such a fruit has not appeared, and, perhaps, is not likely to be found, but fruits fulfilling part of these requisites are available, and by combining several of these and using a little foresight in planting, much good can be accomplished. Probably some form of the Juneberry would serve to divert many birds from early fruits, and possibly some species of Mulberry would keep up the attraction for a week or two longer. The Wild Cherry planted freely along road-sides and between fields would save many thefts of grapes from neighboring vineyards, and the Elder and Viburnum would be useful, as well as ornamental, if included more generally in hedges and shrubberies.

Notes.

It is said that a pure white Delphinium has been produced by Messrs. Kelway & Son, of Langport Nurseries, Somerset.

The amount of cider made in France during 1892 was the largest since the year 1885, reaching a total of 340,679,835 gallons.

We are advised that the seed firms of Messrs. C. H. Thompson & Co., Parker & Wood and Joseph Breck & Sons, of Boston, have been united under the name of Joseph Breck & Sons.

Under the name of Pyrus angustifolia flore-pleno there is figured, in a recent issue of the *Gardeners' Chronicle*, the double-flowered American Crab, which appeared a few years

ago in a nursery in the western states, and which is really a form of P. coronaria, the northern Crab, P. angustifolia being confined to the southern states. This double-flowered Apple-tree is one of the best among the recent introductions of hardy plants, and it should be more often seen than it is in our gardens.

A Spanish authority on Roses, Dr. Mariano Vergara, has recently published at Madrid a small book, *Bibliografia de la Rosa*. Among the contents is a list of books dealing with this plant, of periodicals, existent and deceased, which have been devoted to it, of the catalogues published by Rose-growers in various countries, and of the Rose-growers' associations and societies in all parts of the world. The practical utility of the little volume is further increased by the fact that only alternate pages are printed, the others being left in blank for manuscript notes.

A late dispatch to the New York *Tribune* states that one rancher in San Diego County has sown this year 160 acres to mustard on dry mesa land, and though the season has been so dry as to kill barley, the mustard has grown luxuriantly. It yielded a ton of seed to the acre, worth $200 a ton. In the same county the agent of an English syndicate is inspecting sites for the establishment of a beet-sugar colony. The plan is to buy 100,000 acres, divide the tract into twenty-acre colony homes, and settle upon it small English farmers, who will grow sugar-beets to supply the company's factory and refinery.

A correspondent of the *Country Gentleman* writes that in Lancashire acres of glass are devoted, and devoted successfully, to the growth of Cucumbers, Tomatoes and some other paying things, which return well for artificial heat and for protection from frost. Thus far the experiment has done admirably, the prices obtained being far in excess of what is commanded by their more sunnily situated competitors. Of course, the fact of being within cartable distance of the Warwickshire coal-fields is a great factor in economizing expense, while proximity to markets that seem never to be surcharged also helps wonderfully.

A recent issue of the London *Garden* refers to the small-leaved Mock Orange, Philadelphus microphyllus, as a very valuable shrub, especially when in flower, as its flower-laden branches bend over to touch the turf. It is also deliciously fragrant. He adds: "Being an introduction from Mexico, it is not hardy in the more northern districts of England." This plant has proved hardy as far north as New England, where it makes an admirable little shrub for the rock-garden. It is a native of the mountains of southern Colorado and New Mexico, whence it was introduced into cultivation several years ago by the Arnold Arboretum.

A floor space, 42x27 feet, has been reserved in the centre of the Forestry Building of the Columbian Exposition, for the American Museum of Natural History of this city, which will exhibit a duplicate set from the Jesup Collection of North American Woods. More than 400 species will be represented in the collection by half-sections of trunks 14 inches long, which will be arranged on shelves in two cabinets. Each specimen will be accompanied by a label 12x6 inches. One-half of the label will consist of a map of North America, colored in green, to indicate the distribution of the species, the other half containing a brief description of the tree and its uses. These labels are now being prepared at the Arnold Arboretum by an officer of the Museum.

In the Fruit report of the South Haven Sub-station of the Michigan State Agricultural College, Mr. T. T. Lyon names the following varieties of grapes for a family vineyard in that region which will give in succession fruit of high quality. The varieties are given in the order of their ripening: Early Victor, Winchell, Worden, Lady, Delaware, Diamond, Brighton, Ulster and Jefferson. For a family garden list of red and yellow Raspberries, Hansell, Cuthbert, Golden Queen and Herstine, if protected in winter, are named; while of Black Caps, Palmer, Hilborn and Earhart for an autumn crop, with Shaffer and Muskingum for canning. For a family plantation of Strawberries, Alpha, Beder Wood, Cumberland, Parker Earle and Gandy are named.

An instructive bulletin has just been issued by the Ontario Agricultural College, on "Weeds and the Modes of Destroying Them." It sets out by enumerating the various agencies by which weeds are distributed, and then lays down certain general principles to be observed in destroying them. These latter include a study of their habits, with the different methods to be used for annuals, biennials and perennials; certain directions in reference to the rotation of crops, hindering weeds from ripening seed, and the necessity of care in purchasing seeds for the farm and garden. Then follow specific directions for the destruction of the most troublesome weeds, like Canada Thistle, Couch Grass, Burdock, Wild Mustard, etc. The little book contains good illustrations of various noxious growths, and altogether it is worth careful reading, not only by the farmers of Ontario, but by people interested in agriculture and horticulture on this side of the boundary.

The growing interest in trees in this country is shown by the number of publications relating to them which have recently appeared. The last to reach us is entitled *The Woody Plants of Manhattan in their Winter Condition*, a pamphlet of twenty pages, in which Professor A. S. Hitchcock has arranged the woody plants of central Kansas according to the appearance of their branchlets in winter and the character of their winter buds. His first division includes such plants as show more than one leaf-scar at each node, with subdivisions in which genera with pubescent and glabrous buds are grouped. In his second division (B) are placed those genera which have one leaf-scar at each node, with two subdivisions, in which are placed plants armed with prickles or thorns and those which are unarmed. A quotation from the description of the White Maple (Acer saccharinum) will serve to show the scope and value of this interesting paper. It reads: "A large tree with reddish or yellowish brown glabrous twigs, V-shaped, opposite leaf-scars not quite meeting, but joined by a line and three-bundle scars. Terminal buds with two or three pairs, the appressed lateral with one or two pairs of smooth ovate-obtuse scales. Common along the Blue and the Kansas River below the mouth of the Blue." The list includes sixty-three native plants and four which, common in cultivation, have escaped from gardens.

We are indebted to Professor Trelease for advance-sheets of the fourth annual report of the directors of the Missouri Botanic Garden. From them it appears that the income of this magnificently endowed establishment amounted last year to $98,830.97, and that the expenditures were $72,936.40, of which nearly $17,000 were paid for labor in the garden, while only about $500 were spent on the herbarium and $1,600 upon the library. In the herbarium there are now 203,000 specimens, including the 98,000 specimens from the George Engelman Herbarium, the nucleus of the collection. The library contains in round numbers 5,000 volumes and 6,000 pamphlets, the whole being appraised at $21,150.00. Visitors to the garden are increasing, 16,000 having entered its gates on the open Sunday in June. The number of species of plants in the garden has been greatly enlarged during the year by contributions of seeds and living plants from other botanical establishments, and more than 3,000 packages of seeds were distributed in return. Professor Trelease reports that Dr. E. Lewis Sturtevant has presented to the garden his entire botanical library, particularly rich in pre-Linnæan works, which the donor has been collecting for many years. The course of study for garden pupils, one of the most valuable features in this establishment, has been shortened from six to four years, it having been found, after the practical working of the system during the last three years, that the course could be thus modified without omitting any of the manual labor or any of the studies originally determined on. Of the seventy-two weekly exercises, each for three months, which the garden pupils receive, twenty are given to the garden proper, including fruit-culture, nine to surveying, drainage and landscape-gardening, six to book-keeping, seven to economic entomology, five to forestry, and twenty-five to botany in its direct application to gardening.

Catalogues Received.

Brackenridge & Co., Rosebank Nurseries, Govanstown, Md.; Wholesale and Retail Catalogue of Orchids.—Alfred Bridgeman, 37 East Nineteenth Street, New York, N. Y.; Standard Vegetable, Grass and Flower Seeds.—William Bull, 536 King's Road, Chelsea, London, S. W.; Novelties and Specialties in Flower and Vegetable Seeds.—John Burton, Chestnut Hill, Philadelphia, Pa.; American Belle Rose.—Iowa Seed Co., Des Moines, Iowa; Fruit and Vegetable Novelties, Vegetable Plants and Roots, Flower Seeds, Roses.—D. Landreth & Sons, 21 and 23 South Sixth Street, Philadelphia, Pa.; Flower, Vegetable and Grass Seeds.—William G. McTear, Princeton, N. J.; Descriptive List of Chrysanthemums.—Price & Reed, Albany, N. Y.; Flower, Vegetable and Grass Seeds.—Isaac F. Tillinghast, La Plume, Lackawanna Co., Pa.; Flower and Vegetable Seeds.—J. H. Tryon, Willoughby, Ohio; Price List of Grape Vines.—Vick & Hill, Rochester, N. Y.; Flower Seeds and Plants and Small Fruits.